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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of : Tetsuya Nagano)
et al.)
Serial No.: 10/034,073)
Filed: December 28, 2001)
Title: GRATING, NEGATIVE AND REPLICA)
GRATING OF THE GRATING, AND METHOD)
OF MANUFACTURING THE SAME)
Atty. Dkt.: NGB-12833)
)

Group Art Unit: 1772
Examiner: Donald
Loney

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' BRIEF (37 CFR § 1.192)

This brief is submitted in triplicate, as required by 37 CFR § 1.192(a). A check in the amount of \$340.00 is enclosed to cover the fee listed in 37 CFR § 41.20(b)(2). If any additional fees are due for this filing, please charge such additional required fees to our Deposit Account No. 18-0160, our order No. NGB-12833.

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James A. Balazs

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This brief contains the items under the following headings in the order set forth below:

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I. REAL PARTY IN INTEREST

Shimadzu Corporation, having a place of business at 1 Nishinokyo-Kuwaibaracho, Nakagyo-ku, Kyoto-shi, Kyoto 604-8511 Japan is the real party in interest and the assignee of all right, title, and interest to the invention throughout the world. An assignment from inventors Tetsuya Nagano,

Masaru Koeda, Makoto Sato, Akita Sato and Shinji Miyauchi has been recorded with the United States Patent and Trademark Office and can be found at Reel 012582 and Frame 0483.

II. RELATED APPEALS AND INTERFERENCES

Applicant does not know of any related appeals and/or interferences the will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

Nine claims are currently pending in this application.

B. Status of the Claims

1. Claims previously canceled: None.
2. Claims withdrawn from consideration but not cancelled: 4 and 6-7.
3. Claims pending: 1-3, 5 and 8-9.
4. Claims allowed: None
5. Claims rejected: Claims 1-3, 5, and 8-9.
6. Claims objected to: None
7. Claims indicated as allowable if the § 112 rejections are overcome: None

C. Claims on Appeal

The claims on appeal are: Claims 1-3, 5 and 8-9.

IV. STATUS OF AMENDMENTS

A Response to the Final Office Action was filed on June 25, 2004. The Examiner has indicated in the Advisory Action that the Response did not

place the application in condition for allowance because, in the Examiners opinion, the claims failed to structurally define over the prior art. The Response to the Final Office Action of June 25, 2004 did not propose changes to the pending claims.

V. SUMMARY OF INVENTION

The presently claimed invention relates to a grating and negative and replica gratings manufactured by transfer from the grating. (Specification page 4 lines 10-21, page 6, lines 10-15, page 14, lines 12-21). The grating includes a groove cross section, not of a laminar shape, but instead shaped like a half-sinusoidal wave or a half-sawtooth and wherein the groove bottom has a flat form. (Specification page 7, lines 5-12; Figure 1D, reference 1 and Figure 6). The duty ratio of the grating, i.e. the groove width/groove cycle, may be 0.5 (Specification page 9, line 25 – page 10, line16).

VI. ISSUES

1. Whether Claims 1 and 5 are anticipated under 35 U.S.C. § 102(b) in view of U.S. Patent No. 5,280,388 to Okayama et al.
2. Whether Claims 1 and 5 are anticipated under 35 U.S.C. § 102(b) in view of U.S. Patent No. 5,444,567 to Kataoka et al.
3. Whether Claims 3, 5 and 8-9 are anticipated under 35 U.S.C. 102(b) in view of U.S. Patent No. 6,099,146 to Imamura et al.
4. Whether Claim 2 is obvious under 35 U.S.C. § 103 over U.S. Patent No. 5,280,388 to Okayama et al. in view of U.S. Patent No. 6,099,146 to Imamura et al.

5. Whether Claim 2 is obvious under 35 U.S.C. § 103 over U.S. Patent No. 5,444,567 to Kataoka et al. in view of U.S. Patent No. 6,099,146 to Imamura et al.

VII. GROUPING OF CLAIMS

The following groups of claims are regarded as being separately patentable.

Group I - Claims 1, 3 and 5

Group II - Claim 2

Group III - Claims 8 and 9

VIII. Arguments

A. The Rejection of Claims 1 and 5 under 35 U.S.C. §102(b) as being anticipated by Okayama et al.

"A rejection for anticipation under section 102 requires that each and every limitation of the claimed invention be disclosed in a single prior art reference." *In re Paulsen*, 30 F.3d 1475, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994). The rejection of independent claim 1 and dependent claim 5 is in error and should be reversed, because each and every limitation of the claimed invention is not disclosed by Okayama et al.

Independent claim 1 defines patentably over Okayama et al. Claim 1 describes a grating having a groove cross section shape that is a half sinusoidal wave and a groove bottom part shaped as a flat form.

The Examiner's asserts that Okayama et al. teaches a grating having a groove shaped as a half-sinusoidal wave, as required by the present invention.

The Examiner refers to Figure 2 showing a wave section 10 and flat grooved portions therebetween.

Okayama et al. is directed toward an optical low-pass filter that is formed from a multi-layer structure and is adapted to generate a phase difference at a boundary of the layers. The layers are selected so as to have, at a selected wavelength, the same refractive index while having different refractive index dispersions.

With reference to Fig. 2, Okayama et al. teaches a layer 8 on the object side, a layer 9 on the image side, and structure 10 for generating a phase difference at the boundary of the two layers 8, 9. The structure 10 is only shown schematically in Fig. 2 and Fig. 8. In this regard, the reference states at Col. 3, lines 10-11: "element 3 is a wavelength selective phase grating optical low-pass filter of this invention" and Col. 3, lines 29-34, wherein it is stated that: "In FIG. 2, numeral 8 denotes a layer on the object side; element 9 is a layer on the image plane side, and element 10 is a structure for generating a phase difference formed at the boundary of the two layers, and having a section configuration to have periodicity in the direction of x in the figure." The illustration in Fig. 2 is only schematic, and does not define a particular structure for the "structure for generating a phase difference formed at the boundary of the two layers". Rather, reference must be made to Figs. 3 and 4 for the only examples of the structure 10 provided in the Okayama et al. patent. The reference states at Col. 3, lines 28-30, "FIG. 3 and FIG. 4 show

the configurations of the structure for generating the phase difference in the direction of x in FIG. 2".

Fig. 3 of Okayama et al. shows the structure 10 as being triangular in shape, whereas Fig. 4 of Okayama et al. shows the structure 10 as being trapezoidal in shape. As noted at Col. 4, lines 12-16, "Accordingly, as a configuration of the structure 10 for generating the phase difference, the MFT characteristics on each wavelength band for the case where the configurations as shown in FIG. 3 and FIG. 4 are used are shown in FIG. 5 and FIG. 6, respectively." There is no disclosure or suggestion in the Okayama et al. patent that the structure 10 be anything other than what is shown in FIG. 3 or FIG. 4. Accordingly, the Examiner's assertion that Okayama et al. teaches a grating having a groove shaped as a half-sinusoidal wave, as required by the present invention, is in error.

Accordingly, with reference to claim 1 and claim 5, the Okayama et al. patent does not teach or suggest that the groove cross section shape is a half sinusoidal wave. Rather, Okayama et al. only teaches a groove having a triangular or trapezoidal cross section shape.

B. The Rejection of Claims 1 and 5 under 35 U.S.C. §102(b) as being anticipated by Kataoka et al.

"A rejection for anticipation under section 102 requires that each and every limitation of the claimed invention be disclosed in a single prior art reference." *In re Paulsen*, 30 F.3d 1475, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994). The rejection of independent claim 1 and dependent claim 5 is in error

and should be reversed, because each and every limitation of the claimed invention is not disclosed by Kataoka et al.

Independent claim 1 defines patentably over Kataoka et al. Claim 1 describes a grating having a groove cross section shape that is a half sinusoidal wave and a groove bottom part shaped as a flat form.

The Examiner asserts that Kataoka et al. teaches a grating having a groove shaped as a half-sinusoidal wave, as required by the present invention. Specifically, the Examiner states the elements 13 in Figures 7, 8 and 12 show a structure substantially identical to Figure 1D of the application at issue.

Kataoka et al. teaches a light control device including a diffraction grating. The grating is shown schematically in Figs. 7, 8, 9 and 12 of Kataoka et al.. There is no description in Kataoka et al. of the shape of the diffraction grating.

It is submitted that the illustration of the grating in Figs. 7, 8 and 12 is schematic in nature, and cannot be taken literally. For example, it would be clear to one skilled in the art that the size of the grating lines is such that they will not be visible in the manner depicted in Figs. 7, 8 and 12. Rather, in order to show 'something' when preparing these figures, the illustrator added 'bumps' to the figures as representing the grating lines. In this regard, comparison of the 'gratings' of Figs. 7 and 8 is made with those of Fig. 9.

Regarding the use of drawings and pictures as prior art, the Manual of Patent Examining Procedure states that drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art. *In re Aslanian*, 590 F.2d 911, 200 USPQ 500 (CCPA 1979); MPEP § 2125. Since Figures 7, 8, and 9 of Kataoka et al. could reasonably be interpreted by one

with ordinary skill in the art as showing something other than a half-sinusoidal shaped groove in a grating, these figures cannot be said to disclose the claimed grating structure.

Clearly, Kataoka et al. is not directed toward a particular grating structure, but merely uses the grating as an alternative to the prism. Accordingly, the Kataoka et al. patent can only properly be cited for teaching that the prism structure and the grating may be interchangeably used in the application as a light control structure.

It is submitted that, due to the complete lack of disclosure, the Kataoka et al. grating can only be interpreted as being some already known (i.e., conventional) grating structure. Kataoka et al. may not properly be cited for teaching a particular grating structure because Kataoka et al. is silent as to the shape of the grating, which is the subject of the present invention.

Thus, the Examiner's assertion that Kataoka et al. teaches a grating having a groove shaped as a half-sinusoidal wave is in error and the rejection of claims 1 and 5 on this basis should be reversed.

C. The Rejection of Claims 3, 5 and 8-9 under 35 U.S.C. §102(b) as being anticipated by Imamura et al.

The Examiner asserts that Imamura et al. teaches a grating containing a projection portion of a half saw tooth wave wherein the groove bottom part is flat, referring specifically to Figures 1a and 1c of Imamura et al. The Examiner further asserts that Applicant's saw tooth recitation does not distinguish from a square or trapezoidal tooth since no structure distinguishing it therefrom is recited. The rejection is in error because none of the shapes taught by Imamura are a "half sawtooth wave" as required.

The Imamura et al. reference teaches a diffraction grating that may have one of a series of different groove cross sectional shapes. Fig. 1a teaches a rectangular or square wave shape; Fig. 1b teaches a triangular shape; Fig. 1c teaches a trapezoidal shape; Fig. 1d teaches a sawtooth shape. None of these shapes is a "half sawtooth wave shape" as required by claim 3 and 5.

In this regard it is noted that the Examiner has concluded that a square or trapezoidal shape is the same as a 'half sawtooth wave shape'. It is submitted that this conclusion is clearly in error. A sawtooth wave is commonly known as a wave generated by the mathematical function $y = x - \text{floor}(x)$, wherein $\text{floor}(x)$ is the largest integer less than or equal to the real number x . (See www.open-encyclopedia.com (lookup *Sawtooth Wave*) and www.brainyencyclopedia.com (lookup *Floor Function*)). Thus, in a graphical form, as x is increased incrementally through the real numbers 1, 1.1, 1.2, 1.3, 1.4.....1.9 , $\text{floor}(x)$ will remain as the integer 1 and y will increase incrementally as well $1-1=0$, $1.1-1=0.1$, $1.2-1=0.2$, $1.3-1=0.3$, thus, creating a line of constant slope. When x reaches 2, $\text{floor}(x)$ will also become 2, and y becomes 0, $2-2=0$, thus graphically providing the vertical drop common in the sawtooth wave. Cutting the sawtooth wave in half (*half sawtooth wave*) provides the flat bottom part claimed by applicant.

Assuming that the terms are given their ordinary meaning, it is considered apparent that each of the terms "square wave shape" and "trapezoidal shape" and "half sawtooth wave shape" have a definite meaning in the art. It is further submitted that these terms have completely different meanings, and one skilled in the art would never consider a "square wave" or

"trapezoid" as being equivalent to a "half sawtooth wave". Specifically a "square wave" does not include the sloped leading face of a "half sawtooth wave" and a trapezoid does not include the generally vertical trailing face of a "half sawtooth wave." The "half sawtooth wave" does not have symmetrical leading and trailing faces and as such is not the equivalent of a "trapezoidal shape" or "square wave shape" both of which are symmetrical. Thus, it is respectfully submitted that the Examiner's rejection is in error.

On the other hand, if the terms are interpreted as used in the specification, then it is likewise clear that the "half sawtooth" is completely different than the square wave or trapezoidal wave of Imamura et al. In this regard, reference is made to the Specification, page 15, lines 9-12 ("The grating of the present invention may have a groove cross section shaped like a half sawtooth, or a half sawtooth with a flat tip as shown in Fig. 6."), page 16, lines 2-4 ("...the grating having the groove cross section shaped like a half sawtooth, a half sinusoidal wave, and a half sawtooth with a flat top") and Figure 6 (which shows a half saw tooth wave with a flat top).

D. The Rejection of Claim 2 under 35 U.S.C. §103(a) over Okayama et al. in view of Imamura et al.

There is no suggestion or motivation in the art to support a combination of the Okayama et al. and Imamura et al. references, as suggested by the Examiner. The mere fact that a better product may result from the combination is not sufficient, under US patent law, to support the combination. It is considered apparent that the present application provides the only

motivation for the combination of references and, as such, the rejection of claim 2 base upon this combination is invalid for hindsight.

Additionally, even if the references were combined in the manner proposed by the Examiner, the present invention would not result. Claim 2 depends directly on claim 1 and, thus, includes a grating wherein a "groove cross section shape is a half sinusoidal wave and said groove bottom part is shaped as a flat form."

With reference to Fig. 2, Okayama et al. teaches a layer 8 on the object side, a layer 9 on the image side, and structure 10 for generating a phase difference at the boundary of the two layers 8, 9. The structure 10 is only shown schematically in Fig. 2 and Fig. 8. In this regard, the reference states at Col. 3, lines 10-11: "element 3 is a wavelength selective phase grating optical low-pass filter of this invention" and Col. 3, lines 29-34, wherein it is stated that: "In FIG. 2, numeral 8 denotes a layer on the object side; element 9 is a layer on the image plane side, and element 10 is a structure for generating a phase difference formed at the boundary of the two layers, and having a section configuration to have periodicity in the direction of x in the figure." The illustration in Fig. 2 is only schematic, and does not define a particular structure for the "structure for generating a phase difference formed at the boundary of the two layers". Rather, reference must be made to Figs. 3 and 4 for the only examples of the structure 10 provided in the Okayama et al. patent. The reference states at Col. 3, lines 28-30, "FIG. 3 and FIG. 4 show the configurations of the structure for generating the phase difference in the direction of x in FIG. 2".

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Imamura et al. does not disclose any diffracting grating resembling a half sinusoidal wave shape. As a result, even if Okayama et al. and Imamura et al. were combined, the invention defined in claim 2 would not result. Accordingly, the rejection of claim 2 based upon these references should be reversed.

E. The Rejection of Claim 2 under 35 U.S.C. §103(a) over Kataoka et al. in view of Imamura et al.

There is no suggestion or motivation in the art to support a combination of the Kataoka et al. and Imamura et al. references as suggested by the Examiner. The mere fact that a better product may result from the combination is not sufficient, under US patent law, to support the combination. It is considered apparent that the present application provides the only motivation for the combination of references and, as such, the rejection of claim 2 base upon this combination is invalid for hindsight.

Additionally, even if the references were combined in the manner proposed by the Examiner, the present invention would not result. Claim 2 depends directly on claim 1 and, thus, includes a grating wherein a "groove cross section shape is a half sinusoidal wave and said groove bottom part is shaped as a flat form."

Kataoka et al. teaches a light control device including a diffraction grating. The grating is shown schematically in Figs. 7, 8, 9 and 12 of Kataoka et al. There is no description in Kataoka et al. of the shape of the diffraction grating.

It is submitted that the illustration of the grating in Fig. 7, 8 and 12 is schematic in nature, and cannot be taken literally. For example, it would be clear to one skilled in the art that the size of the grating lines is such that they will not be visible in the manner depicted in Figs. 7, 8 and 12. Rather, in order to show 'something' when preparing these figures, the illustrator added 'bumps' to the figures as representing the grating lines. In this regard, comparison of the 'gratings' of Figs. 7 and 8 is made with those of Fig. 9.

Regarding the use of drawings and pictures as prior art, the Manual of Patent Examining Procedure states that drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art. *In re Aslanian*, 590 F.2d 911, 200 USPQ 500 (CCPA 1979); MPEP § 2125. Since Figures 7, 8, and 9 of Kataoka et al. could reasonably be interpreted by one with ordinary skill in the art as showing something other than a half-sinusoidal shaped groove in a grating, these figures cannot be said to disclose the claimed grating structure.

Clearly, Kataoka et al. is not directed toward a particular grating structure, but merely uses the grating as an alternative to the prism. Accordingly, the Kataoka et al. patent can only properly be cited for teaching that the prism structure and the grating may be interchangeably used in the application as a light control structure.

It is submitted that, due to the complete lack of disclosure, the Kataoka et al. grating can only be interpreted as being some already known (i.e., conventional) grating structure. Kataoka et al. may not properly be cited for teaching a particular grating structure because Kataoka et al. is silent as to the shape of the grating, which is the subject of the present invention.

Imamura et al. does not disclose any diffracting grating resembling a half sinusoidal wave shape. As a result, even if Kataoka et al. and Imamura et al. were combined, the invention defined in claim 2 would not result. Accordingly, the rejection of claim 2 based upon these references should be reversed.

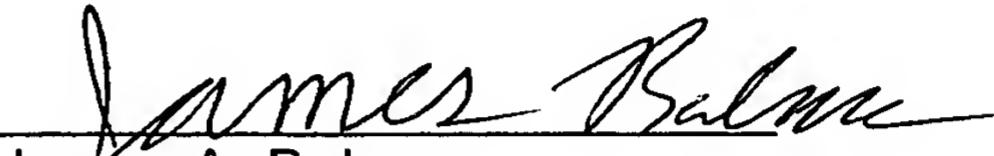
F. Conclusion

The prior art rejections of the cited claims should be reversed because none of the cited references, nor their combination, disclose or suggest the invention recited in the claims. Specifically, the rejection of claims 1 and 5 under 35 U.S.C. §102(b) as being anticipated by Okayama et al. or Kataoka et al. is in error. Also, the rejection of claims 3, 5 and 8-9 under 35 U.S.C. §102(b) as being anticipated by Imamura et al. is in error. Finally, the Rejection of claim 2 under 35 U.S.C. §103(a) over Okayama et al. in view of Imamura et al. or Kataoka et al. in view of Imamura et al. is in error.

For the reasons set forth herein, the rejections of the claims 1-3, 5 and 8-9 of the present application are in error and must be reversed.

Respectfully submitted,
Rankin, Hill, Porter & Clark LLP

Date: 10/25/2004


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APPENDIX A

1. (previously presented) A grating having a groove cross section shape and a groove bottom part, wherein said groove cross section shape is a half sinusoidal wave and said groove bottom part is shaped as a flat form.
2. (original) The grating as claimed in claim 1, wherein a duty ratio of a groove width to a groove cycle of the grating is 0.5.
3. (previously presented) A grating having a groove cross section shape and a groove bottom part, wherein said groove cross section shape is a half sawtooth wave and said groove bottom part is shaped as a flat form.
4. (withdrawn) A negative grating manufactured by transfer from a grating having a groove cross section shape other than a laminar shape and a groove bottom part shaped as a flat form.
5. (previously presented) A replica grating manufactured by transfer from a grating having a groove cross section shape other than a laminar shape and a groove bottom part shaped as a flat form, wherein said groove cross section shape is selected from the group consisting of a half sinusoidal wave and a half sawtooth wave.
6. (withdrawn) A method of manufacturing a negative grating, said comprising:

preparing an original grating having a groove cross section shape other than a laminar shape and a groove bottom part shaped as a flat form; bonding a negative substrate onto the original grating with an adhesive; and paring the negative substrate from the original grating after the adhesive is hardened.

7. (withdrawn) A method of manufacturing a replica grating, said comprising:

preparing a negative grating manufactured from an original grating having a groove cross section shape other than a laminar shape and a groove top part shaped as a flat form; bonding a replica substrate onto the negative grating with an adhesive; and paring the replica substrate from the negative grating after the adhesive is hardened.

8. (previously presented) The grating as claimed in claim 3, wherein a duty ratio of a groove width to a groove cycle of the grating is 0.5.

9. (previously presented) The replica grating as claimed in claim 5, wherein a duty ratio of a groove width to a groove cycle of the grating is 0.5.